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Effect of glutamine and proline spraying on yield and, its components of soft wheat (*Triticum aestivum* L.) genotypes

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Wheat is a cereal grass that belongs to the Poaceae (Gramineae) family. It's one of the most important crops, for sure. During the winter of 2021, researchers conducted farmer's field experiment (Al-Batira area, 20 km away from the center of Maysan Governorate) in silty loam soil, to determine the impact of glutamine and proline spraying on yield and components of different soft wheat genotypes (*Triticum aestivum* L.). The split-plot, randomized, complete-block experiment was set up (R.C.B.D). Two variables were investigated in this experiment: the first factor included; (a control treatment sprayed only with distilled water; amino acid glutamine is sprayed with a concentration of 300 mg l-1; amino acid proline sprayed at a concentration of 300 mg l-1; a treatment in which the amino acids gluten and proline are combined, 150 mg l-1 each). The second factor includes ten newly introduced genotypes from soft wheat, which are as follows; (Russian, ACSAD 133, ADANE 99, ACSAD 59, ACSAD 901, Iranian, Wafiya, Jad (Germanian), Jihan, Bohouth22). The results showed: Wafiya cultivar's superiority, as evidenced by its higher average number of fertile spikes and grain yield, which counted to 398.96 spike^{-1} and 7.76 Mg ha^{-1}, respectively, while cultivar Acsad-901 outperformed in the traits of; grains number per spike^{-1}, biological yield and harvest index with averages of 82.90 grains of spike^{-1}, 16.51 Mg ha^{-1} and 46.16%, respectively. Cultivar Acsad 133 exceeds the characteristic of protein percentage in grains at a rate of 12.05%. The study showed that spraying by amino acids glutamine and proline, especially in the elongation and flowering stage, in the mixed concentration of (150 mg l^{-1}glutamine with 150 mg l^{-1} proline) was significantly superior than other concentrations, as it gave highest averages in the characteristics: fertile spikes number of 392.02 spikes m^2; in grains number per spike^{-1} at 77.89 grains spike^{-1}; grains yield at 7.50 Mg ha^{-1}; biological yield was 16.43 Mg ha^{-1}; harvest index at 45.73%; and protein percentage reached 12.04%.
Keywords: Glutamine; proline; *Triticum aestivum* L.; soft wheat.

INTRODUCTION

Wheat is a member of family Poaceae (Gramineae) and a major cereal crop. It's a one the most crucial crops. It is the main source of energy, giving the human body approximately 25% of calories, carbohydrates, protein and some amino acids, the increase in the cultivation of this crop began to reach self-sufficiency (Dewettinck *et al.,* 2008). The cultivated area of this crop in Iraq in 2020 is about 2143 ha, with a productivity of up to 6.3 million tons. In 2021, Iraq had a total farmland area of 857,400 ha, which produced 6,238.00 tons, with an average of 2.91 t ha^{-1} (Central Agency for Statistics and Information Technology, 2021). In order to meet the nation's nutritional needs for wheat, productivity must be increased and crop quality must be improved. Most studies have found that using high-quality seeds for cultivars and improving the efficiency of agricultural inputs leads to an improvement in crop output (soil and crop service operations). Despite the severe effort by farmers to use the newly approved and newly developed wheat varieties in Iraq to increase productivity, there is still a real problem related to the qualitative characteristics of the grain, especially gluten, which affects its ability to manufacture bread. Most of the local cultivars suffer from the littleness of the gluten of in grains, as the functional properties of the flour depend largely on the gluten proteins. Protein is one of the important components in the wheat grain. It determines its suitability for different nutritional characteristics, and the gluten content in =wheat is 85-90%. i=It plays a role in producing the best type of bread, because the grain quality is good when it is used to make a loaf of respectable size, taste, and smell (Dewettinck *et al.,* 2008).

Since the genetic factor and environmental factors influence the features of the protein quality and composition of wheat,

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the protein quantity and quality of diverse cultivars affects the end product's function (Al-Jilawi, 2017). Therefore, attention and focus began on increasing the productivity of the crop, both quantitatively and qualitatively, by adopting scientific ways to implement crop service operations and adopting an integrated system in adding fertilizers and foliar fertilizers to boost productivity and quality (Rollin, 2014).

The focus has increased recently on the use of amino acids, including glutamine and proline, glutamine is one of the most important amino acids. ; protein formation, stimulating photosynthesis, repairing damaged cells, and strengthening immunity (Sterevaal, 2008). As for proline, it is one of the amino acids that exist freely and contains a second methyl group. It is created due to the inability of tissues to build protein and catabolic processes. Changes in osmotic potential can be achieved in plant tissue by the widespread assembly of proline in leaf cells (Sterevaal, 2008).

MATERIALS AND METHODS

Study site: An experiment was conducted in 2021-2022 (Al-Batira area, 20 km from the city center) in soil which the chemical and physical specifications are given in Table (1) shows glutamine and proline's effect on wheat yield and quality.

Table 1. Shows chemical and physical properties of soil before planting in 2021-2022.

Property		Unit	Value
Chemical properties	Electrical conductivity (ECe)	desmans. m^{-1}	3.4
	pH	-	7.3
	Nitrogen (Ready)	mg. g^{-1}	19
	Ready (phosphorus)		7.2
	Ready (Potassium)		182
Physical properties	Sand	g kg^{-1} soil	260
	Silt		600
	Clay		140
	Soil texture	-	Silty loam

*The tests were performed in the marine science lab at the University of Basra.

Experience factors: The experiment involved studying two factors.

The first: - Sprayed the amino acids proline and glutamine as follows:

A- Spraying simply distilled water (A0) is the control.

B- It's A1, a spray of amino acid glutamine at 300 mg l^{-1}.

The first: - Sprayed the amino acids proline and glutamine as follows:

C- The amino acid proline spray at 300 mg l^{-1}, symbolized by A2.

D- Apply a spray solution containing 150 milligrams per milliliter (mg $^{l-}$1) amino acids glutamine and proline, denoted by the letter A3. The spraying occurs twice, once during the elongation phase and once during the flowering phase.

The second: includes 10 genotypes cultivars of soft wheat (Russian, ACSAD 133, ADANE 99, ACSAD 59, ACSAD 901, Iranian, Wafiya, Jad (Germanian), Jihan, Bohouth22).

Experiment design: Using a split-plot strategy and A RCBD, with three replicates, the treatments contained 40 experimental units. The main plots contained the spray treatments, whereas subplots had the genotypes. The combination was randomly distributed among the factors on the experimental plots, as the number of experimental units was 10 x 4 x 3 = 120.

Agricultural operations: The experimental soil was plowed with disc harrows and leveling machine. The number of experimental units reached 120 experimental units; each repeater contains 40 experimental units and the dimensions of each unit Experimental (2 m x 2 m) included 10 lines of length 2 m per line, with 20 cm between lines, the distance between one experimental unit and another (1 m). Replicas are spaced 2 m apart, leaving 10 plots separated by 2 m. Wheat seeds were planted on the previously mentioned day with a seed amount of (120 kg ha^{-1}) (Sangotegbe *et al*., 2012), in the form of lines, at a rate of 4.8 g per line. Urea fertilizer (N 46 %) was used as the nitrogen source, and 200 kg N was applied in four equal batches during the emergence, branching, elongation, and booting phases.

Before planting, a phosphate fertilizer application of 80 kg ha^{-1} of P_2O_5 was made (Jdoua, 1995). After emergence and again when the plants began to produce branches, a total of 60 kg ha^{-1} of potassium sulfate (42 % K) was used as fertilizer, along with regular irrigation and weeding (Al-Taher, 2005).

Studied traits: After completing the process of harvesting and threshing the grains and cleaning them for each experimental unit separately, measurements of the product items were taken as follows.

Fertile spikes number m^2: After all plants were harvested at full maturity, the number of fertile spikes was determined by taking the distance between the center two lines in each experimental unit and converting it to a per-square-meter value.

Grains number per spike^{-1}: To get this value, we used the mean of the grains in ten manually separated spikes and divided by spike grain yield.

The 1000-Grain Weighing (g): Each sample was weighed at 1000 grains were tallied and picked at random from each experimental unit.

Produced grains (ton ha^{-1}): After manually threshing examined grain yield from two middle lines in each experimental unit (40 x 200 cm), then we separated the straw from the grain and weighed it, and last we calculated the grain yield in milligrams per hectare.

Biological yield (Mg ha^{-1}): The entire midline plants were weighed (grains + straw), and then the weight was converted from g m^2 to Mg ha^{-1}.

Harvest Index (%): The equation was

Harvest index = (grain yield / biological yield) x100 (Donald, 1962)

***Measurement of protein percentage in grains* (%):** The protein content of wheat grain samples was determined using the standard method described by AACCI Method 39-10.01 using the Infrarmatic device supplied by Perten Company using NIR infrared technology for determination of protein content in small grains in Quality Control Laboratory of the Ministry of Trade - General Company for Grain Manufacturing.

RESULTS AND DISCUSSION

***Fertile spikes number m²*:** Mean number of viable spikes per square meter differed between cultivars as shown in Table (2). Average spike yield per square meter for the top-performing cultivar, Wafiya, was 398.96. Despite Accad 133's low average spikes-per-square-meter yield, it was still the lowest of the cultivars tested. Which amounted to 332.51 spikes m². The reason may be due to differences in genetic susceptibility to the production of tillers that turn into fertile spikes, the findings were consistent with those of Abdul Razzaq (2016).

Spraying wheat cultivars with amino acids resulted in statistically significant differences (see Table 2). The combination concentration (150 mg l^{-1} glutamine and 150 mg l^{-1} proline) generated the highest average and significant difference from the other concentrations, 392.02 spike m² compared with the control treatment (spraying by distilled water only), which gave the lowest average of 346.79 spikes m². The reason may be due to the spraying of amino acids that stimulated some physiological processes and increased photosynthesis rates by improving the construction of chlorophyll and increasing the number of fertile tillers that reflect on spikes (AL-said and Kamal, 2008).

These two factors worked together to significantly affect this trait. The combination between cultivar Wafiya and the mixed concentration of (150 mg l^{-1} glutamine and 150 mg l^{-1} proline) gave a highest average of fertile spikes number at 444.57 spikes m². In contrast, the combination (German Gad × control treatment) showed the least average at 292.97 spikes/m². Maybe this is due to the only factors mentioned in the discussion.

***Grains number per spike⁻¹*:** It was noticed from Table (3) genotypes had an effect, amino acid addition and interaction on grains number in spike^{-1}. The cultivar Acsad 901 significantly outperformed most cultivars and gave a highest average 82.90 grains spike^{-1}, alternatively, the average yield from the Turkish cultivar Jihan was only 59.74 grains per spike. The apparent discrepancies between the cultivars may be due to the effect of this characteristic on the genetic environment of each cultivar, as well as its impact on low temperatures during the formation period and the time of these effects before and after the expulsion of spikes. These results agreed with what was indicated by Asal and Fayyad (2014), Kazim (2015), and Farooq et al. (2018), who found cultivar differences in this trait.

The findings of this experiment are shown in Table (3), and they show that the addition of amino acids to plants causes observable variations. The spraying process excelled by mixed amino acids between (150 mg l^{-1} glutamine, 150 mg l^{-1} proline), where grain yields were generally highest number

Table 2. Effect of genotypes, amino acid spraying, and their interaction on fertile spikes number of m²

A/G		Genotypes (G)										Average
		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
Amino	A0	370.98	321.17	310.88	366.83	346.29	322.10	358.50	382.97	292.55	366.10	346.79
acids	A1	421.24	299.22	353.74	363.31	366.12	334.17	415.01	407.08	332.50	348.18	364.23
(A)	A2	416.25	350.86	331.07	370.83	333.23	368.70	377.77	398.33	393.31	354.92	367.07
	A3	376.97	358.78	373.18	441.55	449.67	383.61	444.57	380.68	362.01	327.57	392.02
Average		396.36	332.51	342.22	385.63	373.82	352.15	398.96	392.27	345.09	349.19	
Treatments				A			G			A*G		
0.05 LSD				22.28			27.22			54.43		

Table 3. Effect of genotypes, amino acid spraying, and their interaction on grains number per spike⁻¹

A/G		Genotypes (G)										Average
		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
Amino	A0	72.30	66.25	58.43	68.98	71.55	81.20	70.08	73.81	54.72	70.93	71.47
acids	A1	80.05	78.64	71.28	72.27	85.12	67.88	64.65	64.84	45.88	76.63	72.92
(A)	A2	83.61	65.46	67.16	62.91	78.16	68.94	66.22	71.32	56.85	60.02	69.28
	A3	76.76	66.50	63.51	93.12	96.78	68.03	93.96	70.73	81.50	81.46	77.89
Average		78.18	69.21	65.09	74.32	82.90	71.51	73.73	70.18	59.74	72.26	
Treatments				A			G			A*G		
0.05 LSD				4.31			4.90			9.79		

in spike reached 77.89 grains spike^{-1}, where 300 mg l^{-1} gave 69.28 grains spike^{-1}, However, this concentration is not noticeably different from the others. This may be attributed of amino acids in regulating many physiological processes, including photosynthesis, by enhancing photosynthetic products and giving them a suitable chance to decrease abortion in the inflorescences, competition for food is mitigated. It increased spike^{-1} grain count (Assuero and Tognetti, 2010). The same Table found their interaction. The combination (Acsad 901 × mixed concentration 150 mg l^{-1} glutamine, 150 mg l^{-1} proline) produced an average of 96.78 grains spike-1 higher than any other. In contrast, Combination produced the fewest grains per spike (Jihan × Glutamine concentration only 300 mg l^{-1}).

***1000 grains weight (g)*:** Table (4) showed no significant changes between genotypes of study cultivars and amino acid spraying.

Table (4) showed a significant interaction with some combinations. The combination (German Jad x Proline A2) highest 1000-grain average weight amounting to 56.1 g without significant differences with a number of combinations, while the combination (Russian cultivar × glutamine concentration A1) gave the lowest average was 43.62 g, without significant differences with some combinations. The efficient role in changing the osmotic potential and promoting vegetative growth of plant may account for the correlation between cultivars and spraying amino acid proline of 300 mg l^{-1}, leading to an increase in average weight of 1000 grains, and consequently increasing the weight of 1000 grains. These results agree with the findings by Al-Qazzaz (2010) who found that spraying with proline acid increased the weight of 1000 grains.

***Grain yield (Mg ha^{-1})*:** Table (5) showed revealed there was a large variation in grain production between genotypes. Species Wafiya outperformed and gave a highest a grain yield, which amounted 7.76 Mg ha^{-1} without significant difference from cultivar Acsad 901 and the Russian cultivar V10, as a result of which the mean was 7.48 Mg ha^{-1}. At the same time, Jihan cultivar gave the lowest average at 6.20 Mg ha^{-1}. The superiority cultivar Wafiya in grains yield may be due to superiority in fertile spikes number (Table 2). This result was agreed with AL-Tahir (2014), Al-Asil *et al.* (2018), Al-Salem (2018), who shown that different varieties of wheat have different grain quality characteristics.

Table 5 shows that the consequences of spraying plants with amino acids produce noticeable changes. Treatment of spraying by mixed amino acids (150 mg l^{-1} glutamine, by 150 mg l^{-1} proline) gave a highest average 7.50 Mg ha^{-1}, without notable variation from other concentrations. The control averaged 6.55 Mg ha^{-1}. The reason may be the increase in fertile spikes in Table (2) and grains in spike Table (3).

The components in this feature were shown to interact significantly (Table 5). The combination (Wafiya cultivar × mixture 150 mg l^{-1} glutamine, 150 mg l^{-1} proline) gave a highest grain yield at 10.07 Mg ha^{-1}, significantly different from the other combinations. While the combination (Adane 99 × control treatment) gave a lowest yield of 5.53 Mg ha^{-1}. The reason is attributed to the fact that addition amino acids to the plants at different stages had a role in the response of the genotypes through the stages of plant growth other.

Table 4. Effect of genotypes, amino acid spraying, and their interaction on 1000 grains weight (g)

A/G		Genotypes (G)										Average
		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
Amino acids	A0	50.48	50.94	49.95	51.51	49.50	51.58	46.45	46.00	56.30	50.26	49.83
(A)	A1	43.62	55.61	50.47	52.95	52.72	45.72	48.51	51.84	46.79	51.98	49.91
	A2	45.44	50.03	47.99	55.50	50.20	49.89	44.60	56.31	50.14	51.00	50.09
	A3	43.77	51.09	51.67	43.62	46.29	49.69	53.53	49.28	48.62	50.73	48.94
Average		45.83	51.92	50.02	50.90	49.68	49.22	48.27	50.86	50.46	50.99	
Treatments				A			G				A*G	
0.05 LSD				NS			NS				7.10	

Table 5. Effect of genotypes, amino acid spraying, and their interaction on grains yield (Mg ha^{-1})

A/G		Genotypes (G)										Average
		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
Amino acids	A0	6.77	6.64	5.53	6.88	7.39	6.09	6.54	6.97	5.07	6.63	6.55
(A)	A1	7.58	5.67	6.90	6.49	6.86	6.09	7.07	6.54	6.35	6.20	6.55
	A2	7.47	7.12	6.75	6.85	7.03	6.78	7.37	6.02	6.19	6.40	6.86
	A3	6.33	7.50	7.60	7.46	8.64	6.75	10.07	7.37	7.18	6.54	7.50
Average		7.04	6.73	6.70	6.92	7.48	6.43	7.76	6.73	6.20	6.44	
Treatments			A				G				A*G	
0.05 LSD			0.54				0.69				1.38	

Biological yield (Mg ha^{-1}): Observed differences across cultivars in Table (6) were most pronounced for this trait during the first growing season. Acsad 901 had the greatest mean biological yield, at 16.51 Mg ha^{-1}. While Jihan averaged out to only 13.55 Mg ha^{-1}. Wheat cultivars differ because of a variety of factors. included in the study in biological yield may be due to the difference of these cultivars, fertile spikes number Table (2), which reflects tillers number per unit area, which contributes to accumulation of a dry matter resulting from the different cultivars in the efficiency of their vegetative covering in intercepting and using solar radiation during the growing season and their difference in net photosynthesis per unit area. This result agreed with what Kazem (2015) found of superiority cultivar Bohuth 22 in biological yield, attributing to the difference in cultivars in length of the growth period. As well as their difference in tillers number bearing fertile spikes. These results also agreed with what Al-Husseinawi (2016) and Muhammad *et al.* (2018) indicated, the difference in biological weight of wheat depends on the difference in its genetic composition.

Also, in Table (6), adding amino acids to cultivar plants had significant differences. The mixture (150 mg l^{-1} glutamine and 150 mg l^{-1} proline) gave a highest average 16.43 Mg ha^{-1}, while control treatment had a lowest average at 13.85 Mg ha^{-1}. An amino acid's ability to stimulate growth is what's responsible for the biological yield boost, and providing the reasons leading to an increase in tillers number, this result matched with Al-Qaisi *et al.* (2017), who found a rise in both the number of spikes and the grain production measured by biological yield. It was clear from the same the two factors interacted to significantly affect this attribute (Table). The combination (Acsa 901 x mixture of amino acids 150 mg l^{-1} glutamine, x 150 mg l^{-1} Proline) gave a highest average to 21.49 Mg ha^{-1}. The combination of (Jihan x control treatment) gave a lowest biological yield of 9.89 Mg ha^{-1}. Because amino acids increase growth properties, including tillers number and grains yield, plant's biological yield increased.

Harvest index (%): Table (7) shows cultivar differences in percent harvest index. The cultivar Acsad 901 gave a highest average at 46.16% but did not differ significantly with cultivar Acsad 59, while cultivar Jihan gave a lowest average at 37.66%. The reason may be attributed to discrepancy cultivars how grain yield and, biological yield differ in terms of value at harvest Table (18, 17) on the sequence and the ability of the genetic environment efficiency of source-to-grains conversion. This result was in agreement with what Kazem (2015) found that the variance of cultivars at grain yield and biological yield differ, the harvest index is affected. As the cultivars differ in their ability to distribute net photosynthesis to grains. This result concurred with both Al-Salem (2018), who showed there were significant differences in harvest index %.

Table (7) showed that spraying different concentrations of amino acids harvest index differences. The mixed concentration between (150 mg l^{-1} glutamine, 150 mg l^{-1} proline) produced an average harvest index of 45.73 %, the highest of any method. While spraying by control treatment gave less average was 40.56%. Because of amino acids, which have a role in increasing grain yield, directly related to the harvest index.

Table 6. Effect of genotypes, amino acid spraying, and their interaction on biological yield (Mg ha^{-1})

A/G		Genotypes (G)										Average
		G1	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	
Amino acids	A0	14.74	15.39	11.55	12.63	13.04	13.26	13.79	15.46	9.89	15.34	13.85
(A)	A1	14.79	13.98	15.69	14.54	14.93	14.98	16.11	14.93	14.66	13.25	14.82
	A2	15.88	16.14	15.25	14.85	16.59	16.06	15.21	13.29	14.02	15.87	15.52
	A3	15.43	15.88	17.02	19.82	21.49	14.59	12.95	15.74	15.65	16.77	16.43
Average		15.21	15.35	14.88	15.46	16.51	14.72	14.52	14.86	13.55	15.31	
Treatments			A			G				A*G		
0.05 LSD			0.96			1.44				2.87		

Table 7. Effect of genotypes, amino acid spraying, and their interaction on harvest index (%).

A/G		Genotypes (G)										Average
		G1	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	
Amino acids	A0	39.35	38.60	43.72	43.14	43.21	38.79	40.19	40.27	35.48	39.56	40.56
(A)	A1	42.25	40.58	37.80	44.62	45.98	39.71	43.83	43.16	37.15	41.30	41.90
	A2	43.43	43.05	39.26	46.15	46.60	41.82	44.64	45.24	38.84	41.72	43.37
	A3	44.71	45.44	40.75	48.04	48.85	45.33	45.95	46.24	39.19	46.60	45.73
Average		42.44	41.92	40.39	45.49	46.16	41.41	43.65	43.73	37.66	42.30	
Treatments				A			G				A*G	
0.05 LSD				1.69			1.54				3.08	

Table 8. Effect of genotypes, amino acid spraying, and their interaction on protein percentage in grains (%).

A/G		Genotypes (G)										Average
		G1	**G2**	**G3**	**G4**	**G5**	**G6**	**G7**	**G8**	**G9**	**G10**	
Amino acids	A0	10.61	10.28	10.78	10.37	11.48	10.51	10.09	10.70	10.09	10.17	10.55
(A)	A1	11.28	11.42	11.92	11.90	11.44	10.82	10.92	10.96	11.15	11.42	11.29
	A2	12.42	12.33	12.23	11.71	12.26	11.52	11.26	11.50	10.56	12.04	11.88
	A3	12.20	14.17	11.63	10.70	12.47	11.64	12.22	11.83	10.14	11.91	12.04
Average		11.63	12.05	11.64	11.17	11.91	11.12	11.12	11.25	10.49	11.38	
Treatments		A				G				A*G		
0.05 LSD		0.32				0.56				1.11		

In terms of how the two elements interact with one another, the cultivar's genotype and amino acid concentration interacted. The combination (Acsad 901 × the mixture of amino acids 150 mg l^{-1} glutamine, 150 mg l^{-1} Proline) the highest harvest index on average at 45.73% without a significant difference from Acsad 59. In contrast, the combination of (Jihan × control treatment) gave a lowest average at 35.48%.

Protein percentage in grains (%)**:** Table (8) shows that there was a big difference in the amount of protein found in the grains of different wheat varieties. The Acsad cultivar 133 outperformed and gave a highest average protein percentage at 12.05%, while Jihan cultivar gave a lowest average protein percentage at 10.49%. This result agreed Al-Yasiri and Al-Sammak (2015), Khan *et al.* (2020) and Al-Ziyadi (2020). What they found was that the protein content of various wheat varieties varied.

It was found from the same Table found a notable variation in wheat yield in response to varying doses of amino acid spraying. The mixture by (150 mg l^{-1} glutamine and 150 mg l^{-1} proline) showed a highest protein percentage at 12.04, with a significant difference from the other concentrations either spraying by control treatment gave a lowest average at 10.55 %. The plant's amino acid spraying may be to blame, which are the main component of proteins, including gluten proteins (Al-Ziyadi (2020). Especially in the vegetative growth stage, where all materials manufactured from photosynthesis move from sources to spikes, consistent with what was mentioned by El-Said and Mahdy (2008) and Kandli *et al.* (2018).

The plant's amino acid spraying may be to blame. The combination between (cultivar Acsad 901×mixed spray treatment of 150 mg l^{-1} glutamine, 150 mg l^{-1} proline) was superior and gave the highest average, amounting to 12.46%, while the combination (cultivar Wafiya x control treatment) gave the lowest average at 10.9%, it did not differ significantly from Jihan cultivar and some combinations (Table 8).

Conclusion**:** The results showed can conclude: the Wafiya cultivar's superiority, as evidenced by its higher average number of fertile spikes and grain yield, while cultivar Acsad-901 outperformed in the traits of; grains number per spike-1, biological yield, and harvest index. Cultivar Acsad 133 exceeds the characteristic of protein percentage in grains.

The study showed that spraying by the mixed concentration of (150 mg l-1glutamine with 150 mg l-1 proline) was significantly superior to other concentrations, as it gave the highest averages in the characteristics: fertile spikes number; in grains number; grains yield; biological yield; harvest index; and protein percentage.

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